

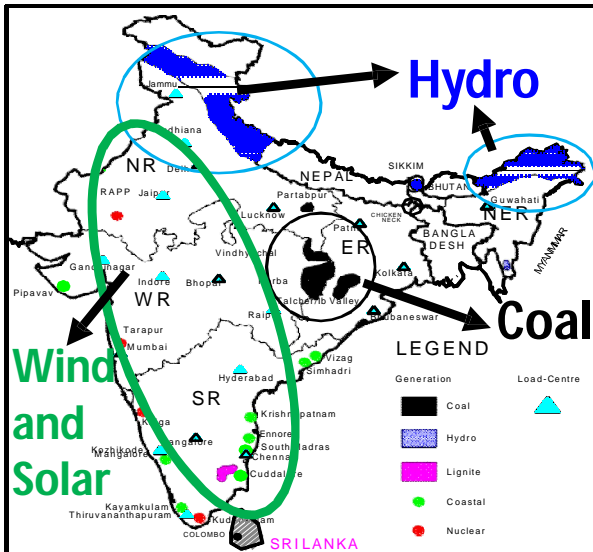
Inter-State Sale and Purchase of RE & Conventional Power



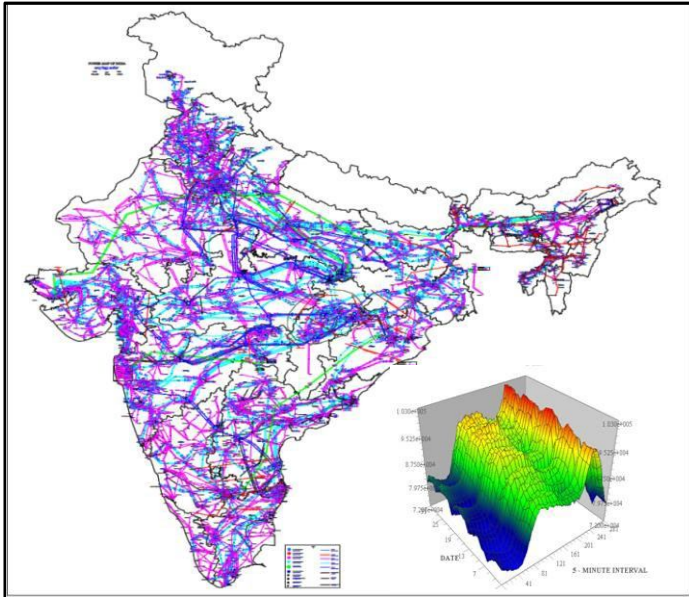
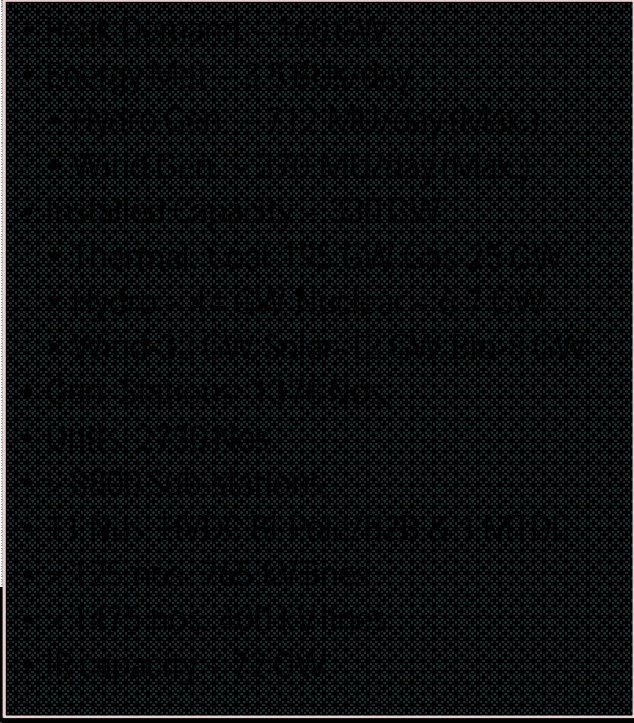
International Workshop on “99+ Grid Availability for RE
Integration, Chennai 23rd Jan 2018

- S. Usha
DGM, WRLDC , Power System Operation Corporation,
Mumbai

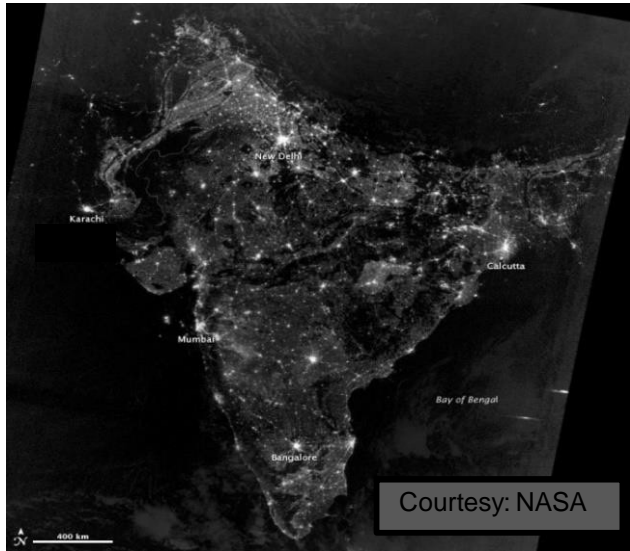
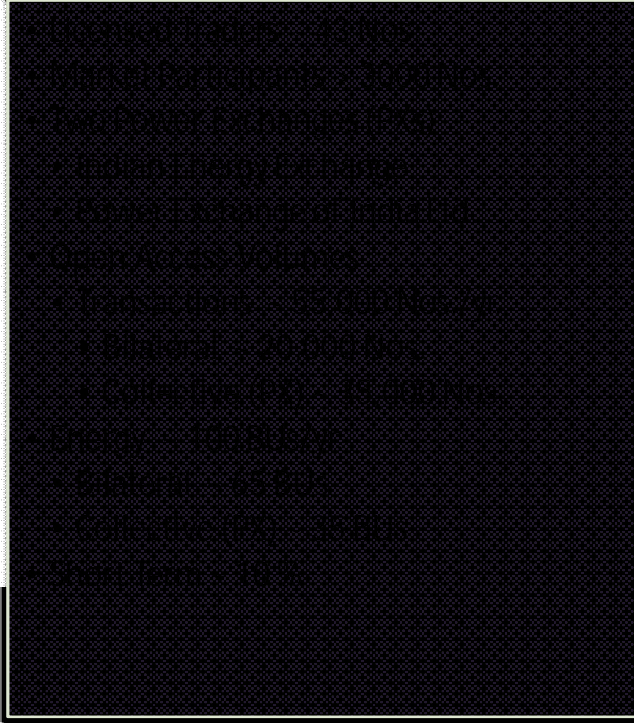
Indian Grid...Large Footprint



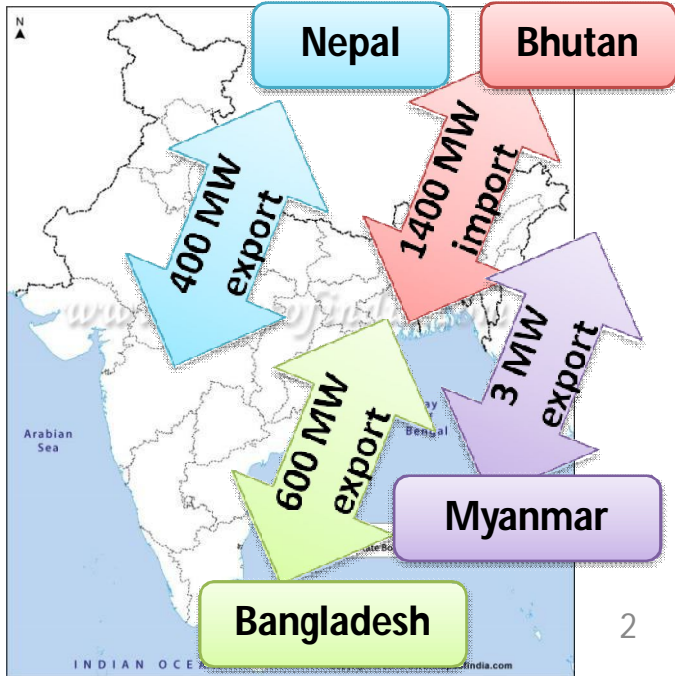
Indian Power System



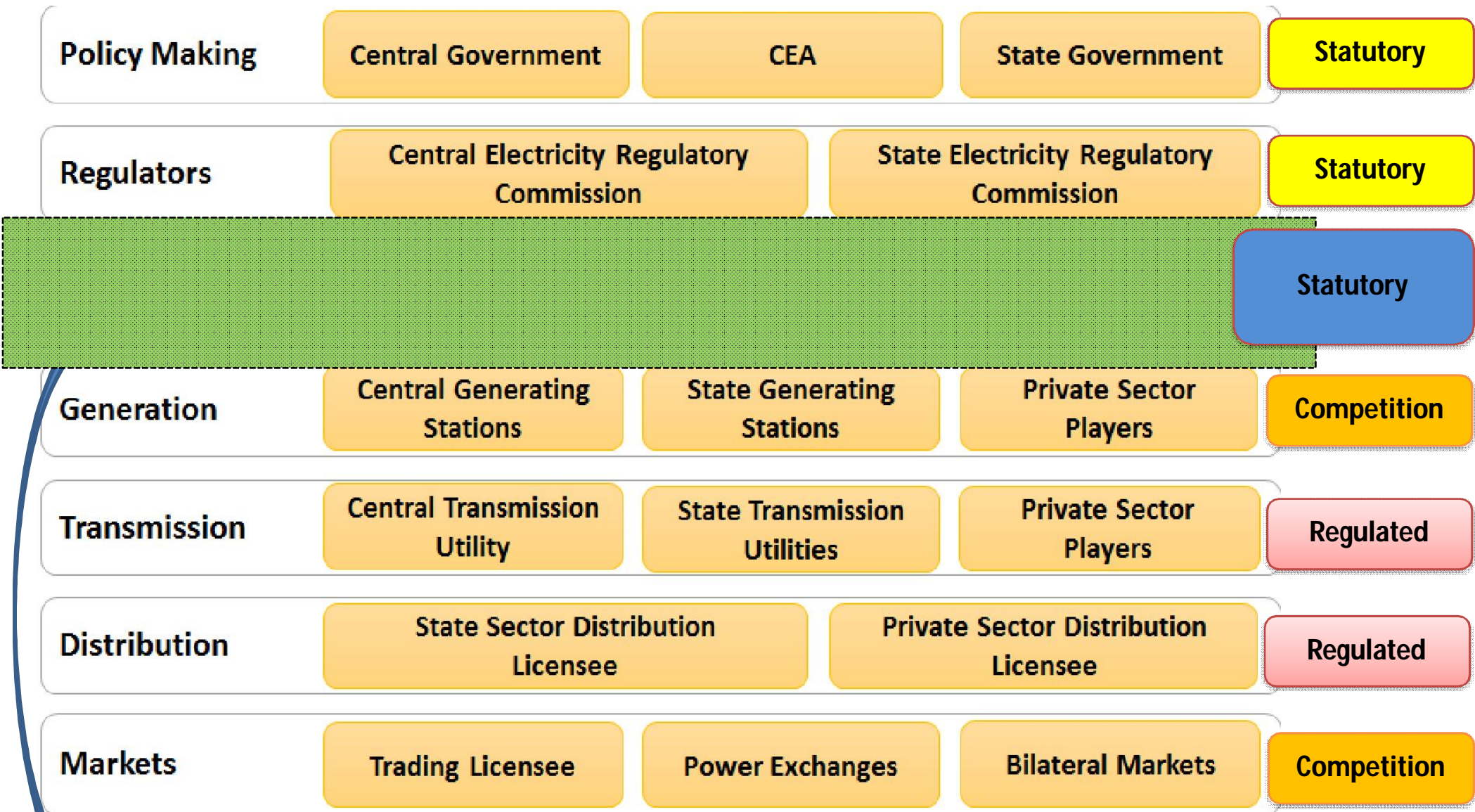
Indian Power Market



International Interconnections



Role of System Operators in Indian Power Sector



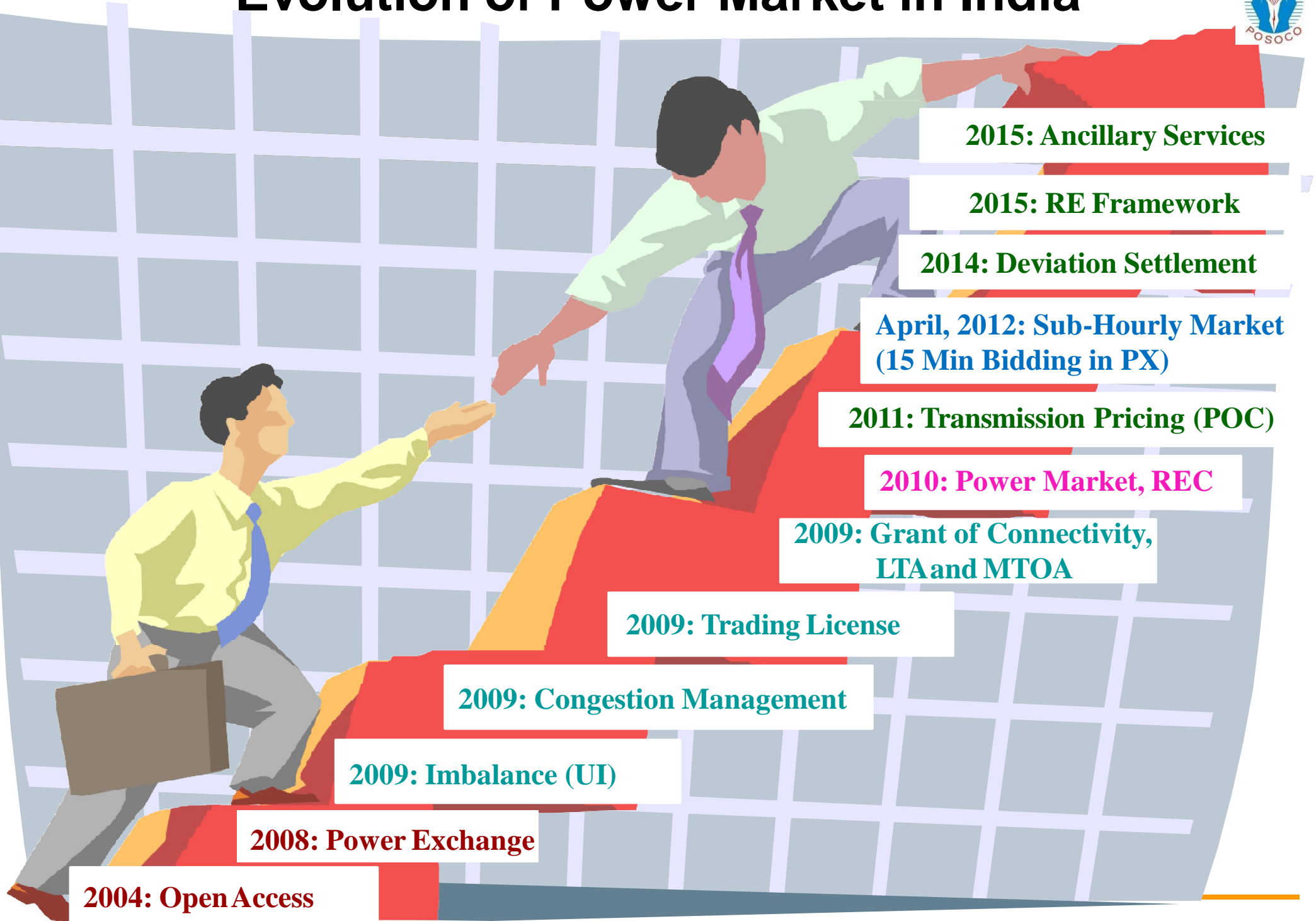
'Vital link' between the administrators, planners & regulators on one end and physical system and market players on the other end

Electricity Act 2003 – An enabler to Power Market



- Generation de-licensed – Sec. 7
- Trading, Transmission, Distribution are licensed – Sec. 14
- Open Access to Transmission / Distribution system for Generators and Consumers - Section 38, 40, 42
- Determination of tariff by (competitive) bidding process based on guidelines issued by GOI – Section 63
- Development of power markets including trading - Section 66
- ✓ *The Appropriate Commission shall endeavour to promote the development of a market (including trading) in power in such manner as may be specified and shall be guided by the National Electricity Policy referred to in Section 3 in this regard;*
- NEP -15% of new capacities be sold outside Long-term PPAs
 - ✓ NEP stipulates power exchanges

Evolution of Power Market in India



2015: Ancillary Services

2015: RE Framework

2014: Deviation Settlement

**April, 2012: Sub-Hourly Market
(15 Min Bidding in PX)**

2011: Transmission Pricing (POC)

2010: Power Market, REC

**2009: Grant of Connectivity,
LTA and MTOA**

2009: Trading License

2009: Congestion Management

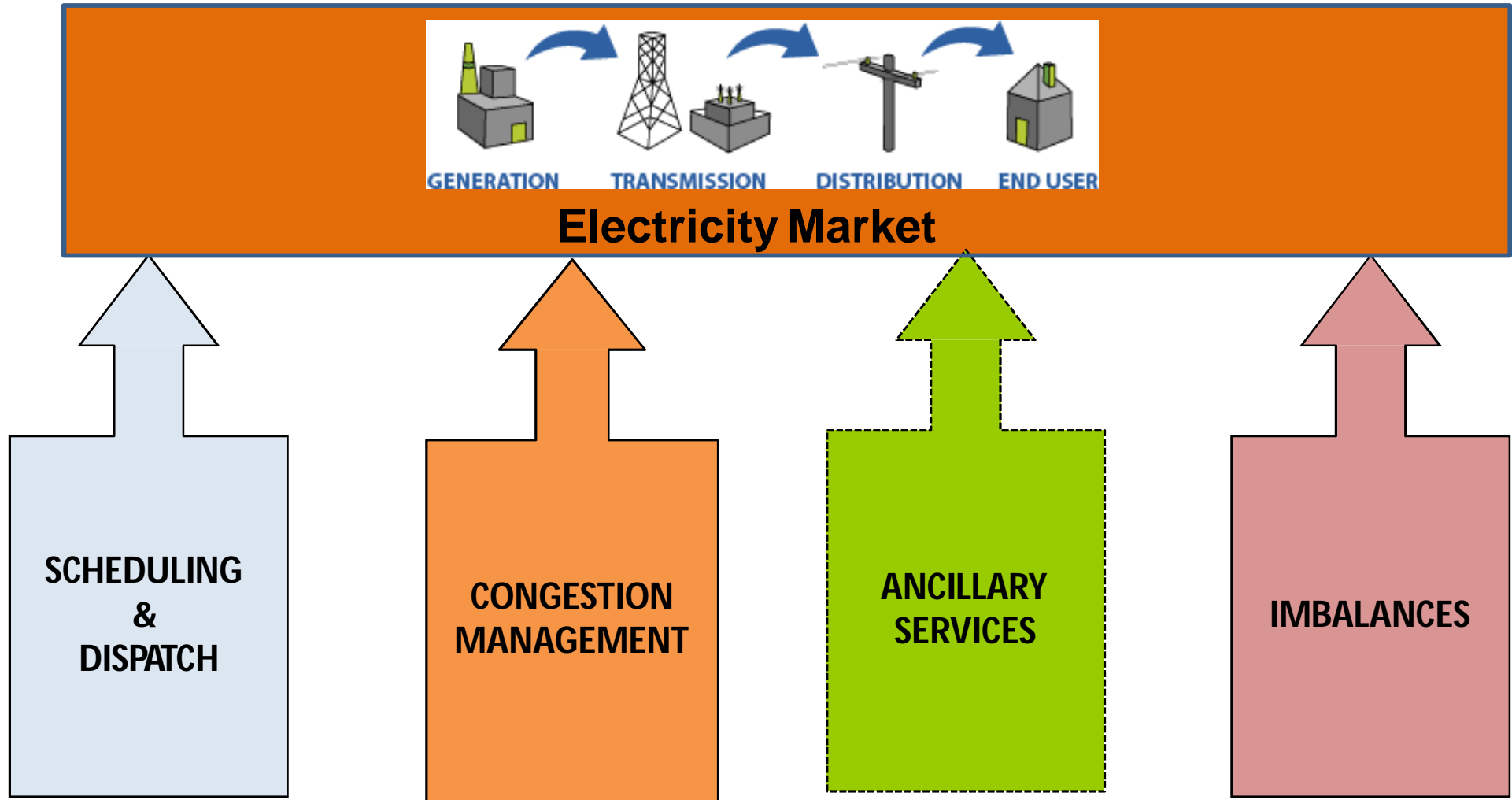
2009: Imbalance (UI)

2008: Power Exchange

2004: Open Access

1/17/2018

Four Pillars of Market Design



"Making Competition Work in Electricity"
- Sally Hunt

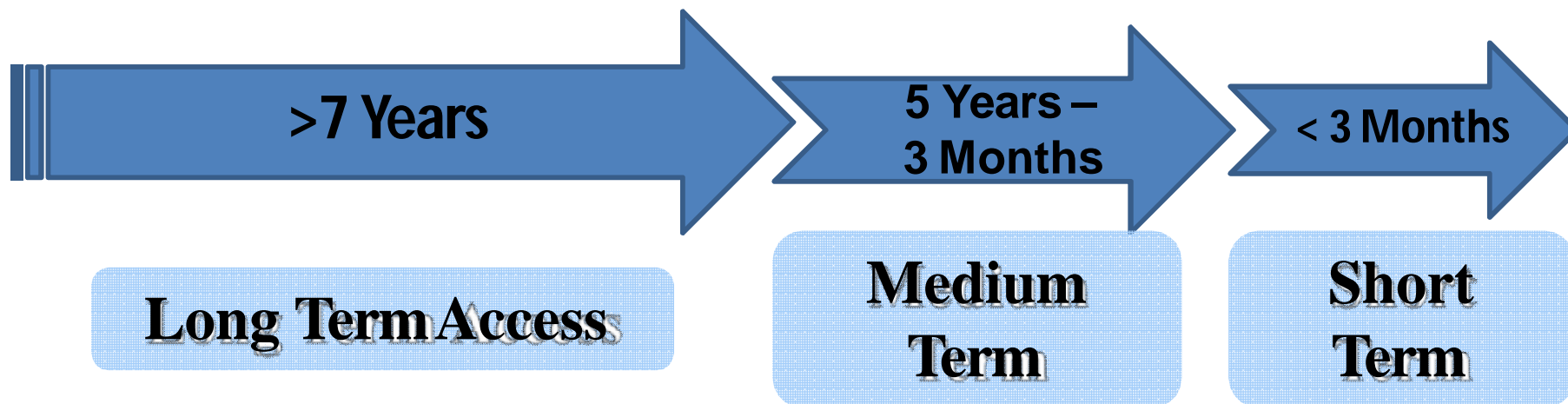
Control Area Jurisdiction

- for Scheduling & Despatch -

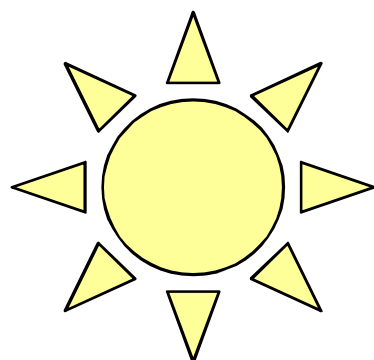
- Generators under RLDC control area (*IEGC- 6.4.2*):
 - a. All CGS (excl. those with 100% allocation to host state)
 - b. UMPPs and Wind/Solar Projects with ≥ 500 MW capacity
 - c. Gen. Station connected to ISTS (**except for case-a**)
 - d. For Generating station connected to both ISTS & State network : **SLDC** will have jurisdiction only if the state has **> 50% share** in that station

NB.: For a generating station connected only to state network – **SLDC** will do scheduling & energy accounting (**excl. case-a**);

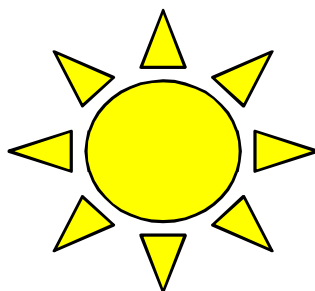
Products for Sale/Purchase of Inter-State power



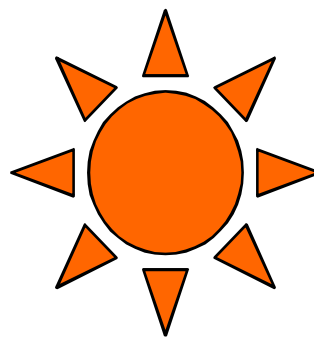
Products in the Short Term Market



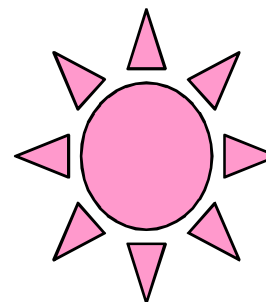
Bilateral - Advance



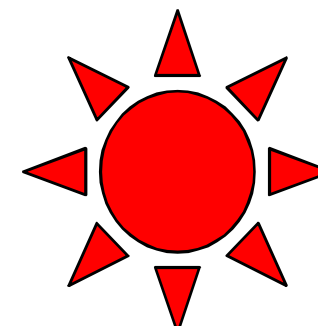
Bilateral - FCFS



PX



Day - Ahead



Contingency

Grid Access for inter-state Sale/Purchase



• Connectivity

- CEA Technical Standards
- CERC Regulations
 - IEGC/Connectivity
 - LVRT Compliance order
- CTU (Procedures)

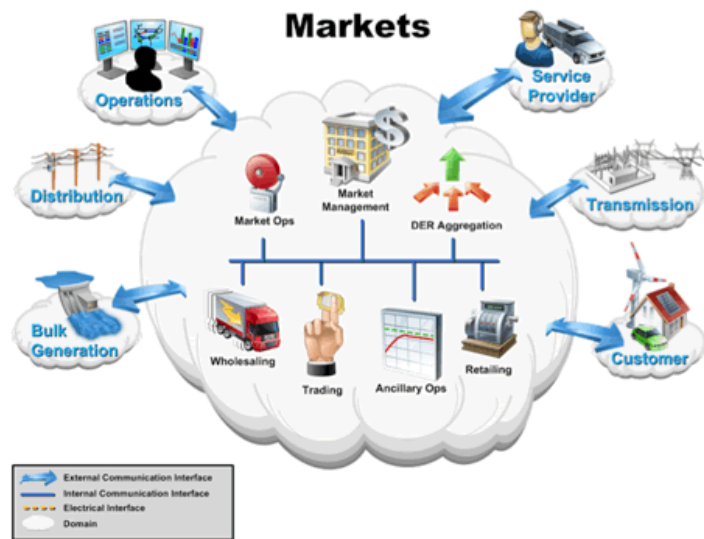
• Access (LTA/MTOA/STOA)

- CTU : LTA & MTOA
- RLDC : STOA
- Scheduling is subject to Access
- CERC Regulations
 - Connectivity, LTA, MTOA
 - Open Access & Power Market
- Way Ahead.....GNA (Draft)

• Compliance Requirements

- RLDC User Registration
- First Charging Procedure
 - Metering/Telemetry/Protection/
 - Reliability/Statutory Approval
- Trial Operation & COD
- Scheduling/DSM/Congestion
- Pool Membership (Reg. Entity)

Scheduling of Inter-State Power



• STOA Bilateral

- Nodal Agency: RLDCs
- Scheduling: RLDC
- Accounting: RPC
- Disbursal: RLDC

• LTA & MTOA –

- Nodal Agency: CTU
- Scheduling : RLDC
- Accounting : RPC
- Disbursal : CTU

• STOA – Collective (PX)

- Nodal Agency: PXs
- Scheduling: NLDC, RLDCs
- Accounting: RPC
- Disbursal: NLDC

Commencement of scheduling is subject to Trial Run & COD

Exemption(s) to Wind/Solar Generators

- DSM delinked from Frequency { Rs.0($f \geq 50.05$) to Rs.8.24/kwh($f < 49.7$)} and linked with Absolute % Error and Fixed PPA Rate/APPC(Rs.3.40/kwh)
- Connectivity eligibility is as low as 5MW compared to 250MW for Conventional.



- **Solar/Wind-Transmission Charge & Loss exempted, if**
 - Awarded through Competitive bidding &
 - Having PPA with DISCOM for RPO compliance &
 - COD during : 01.07.17-01.12.19 (for Solar Generator)
 - COD during : 30.09.17-31.03.19 (for Wind Generator)

http://www.cercind.gov.in/2017/regulation/137_N.pdf

5th amendment of POC regulation 14/12/2017

RE Generators

- Eligibility for Connectivity

- a. Individual Capacity ≥ 50 MW
- b. Individual capacity < 50 MW but aggregate capacity ≥ 50 MW with a **Lead generator** on behalf of all such generators seeking connectivity at a single point on ISTS (Pooling Station)
- c. Eligible conventional generator (exportable capacity ≥ 250 MW) developing RE based generation of '**capacity ≥ 5 MW but < 50 MW**,' in its existing generating station
- d. Any company authorized by the Central Govt. as **Solar/Wind Power Park Developer**

- LVRT Compliance mandated for

- a. All WTG of capacity ≥ 500 kW, connected at ≥ 66 kV
 - b. All Solar Generators at ≥ 11 kV
 - c. **Exemption** allowed for -
 - 'Stall type' WTG
 - WTG useful life expires by 04.01.2021
- Telemetry : SLDCs to ensure availability of telemetered data at RLDC for all wind/solar generators under its jurisdiction.
 - (Ref. CERC Order in 420/MP/2014 dated 05.01.2016)

Connectivity is granted by CTU subject to compliance of applicable CEA Standards & CERC Regulations

Transaction Cost to Generator*



- **Application/Reg. Fees**

- Connectivity(2 to 9 Lakhs)
- LTA & MTOA(2 to 9Lakhs)& (1-4Lakhs)
- STOA (5000/-)
- RLDC Registration(0.5 to 10Lakh)

- **Start-up Power/infirm injection**

- Transmission Charge (PoC)
- DSM Charge
- Congestion charge

- **Tr. & Operating charge**

- STOA /PX
- RLDC Fees & Charges
- Applicable Tr. Charge
- DSM/Congestion Charge



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STU Rates Rs/MWh

State	Effective date	Rate
PSEB	24-Oct-17	1640 (Max.)
HPSEB	23-Nov-17	17 (Min.)

SLDC Rates Rs/Day

State	Effective date	Rate
Meghalaya SLDC	26-May-15	3500 (Max.)
Tamilnadu SLDC	25-May-15	660 (Min)

RLDC Rates Rs/Day

State	Effective date	Rate
RLDC	26-May-15	1000

1/29/2018

POC Zone Slab ..Injection/ Drawal Rate for STOA and LTA/MTOA



15

POC Zone	Effect. Date	POC Rate for STOA... RS/MWh	POC rate for LTA/MTOA.... RS/MW/MONTH *
I	02-Nov-17	283	293699
II	02-Nov-17	253.5	266088
III	02-Nov-17	224	238477
IV	02-Nov-17	194.5	210866
V	02-Nov-17	165	183255
VI	02-Nov-17	135.5	155644
VII	02-Nov-17	106	128033
VIII	02-Nov-17	76.5	100422
IX	02-Nov-17	46.9	72811

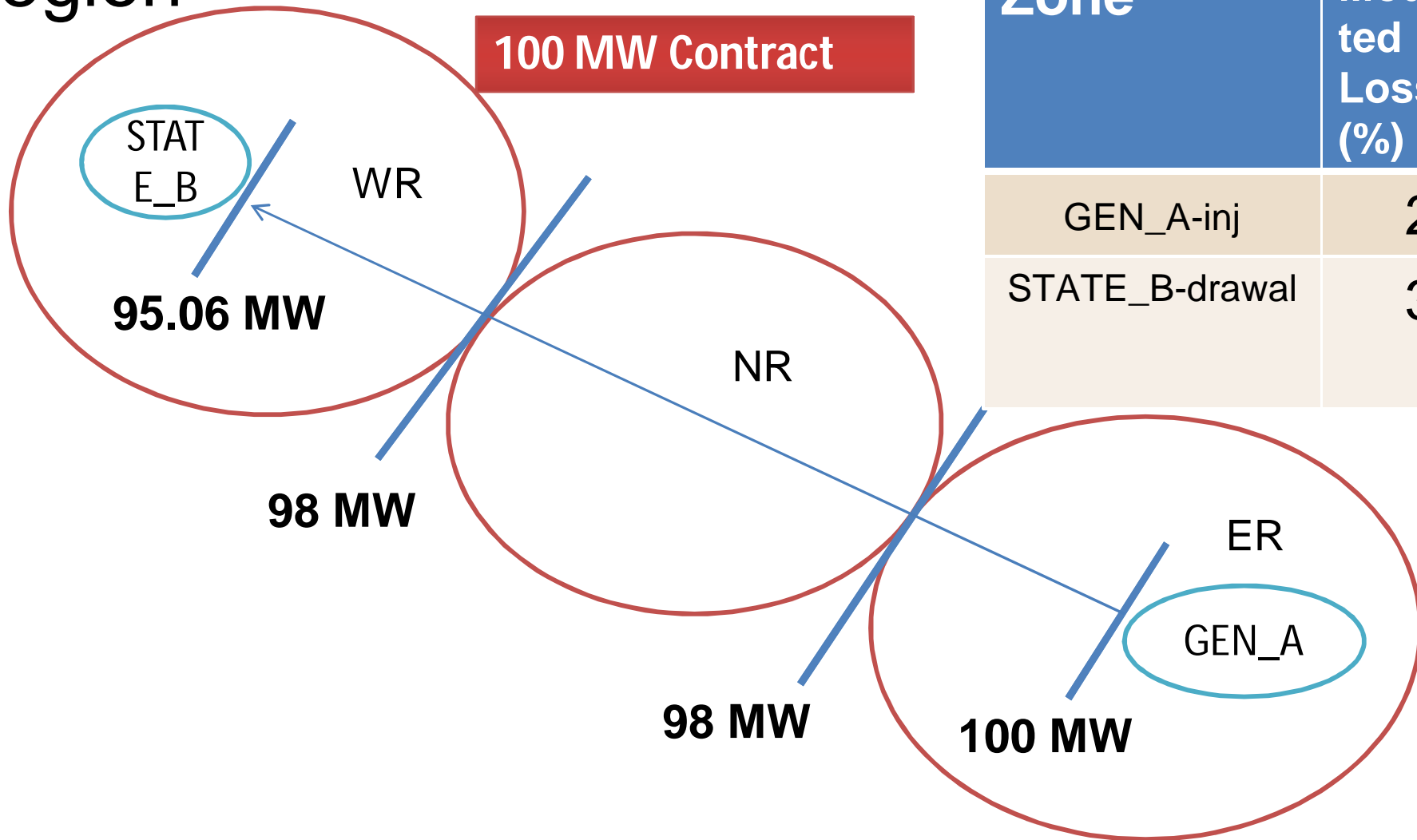
“*” Note: In addition to this Reliability Support Charge of Rs.24271 and HVDC charge of Rs 36093(NR),Rs.14113(SR),Rs.7459(NER,ER & WR) also to be paid to Transmission Licensee



Slab rate for POC losses would be based upon the average losses of each region computed from the SEM data of previous week. The slab rate for POC losses for each region for the period 01.01.2018–07.01.2018 would be as follows:

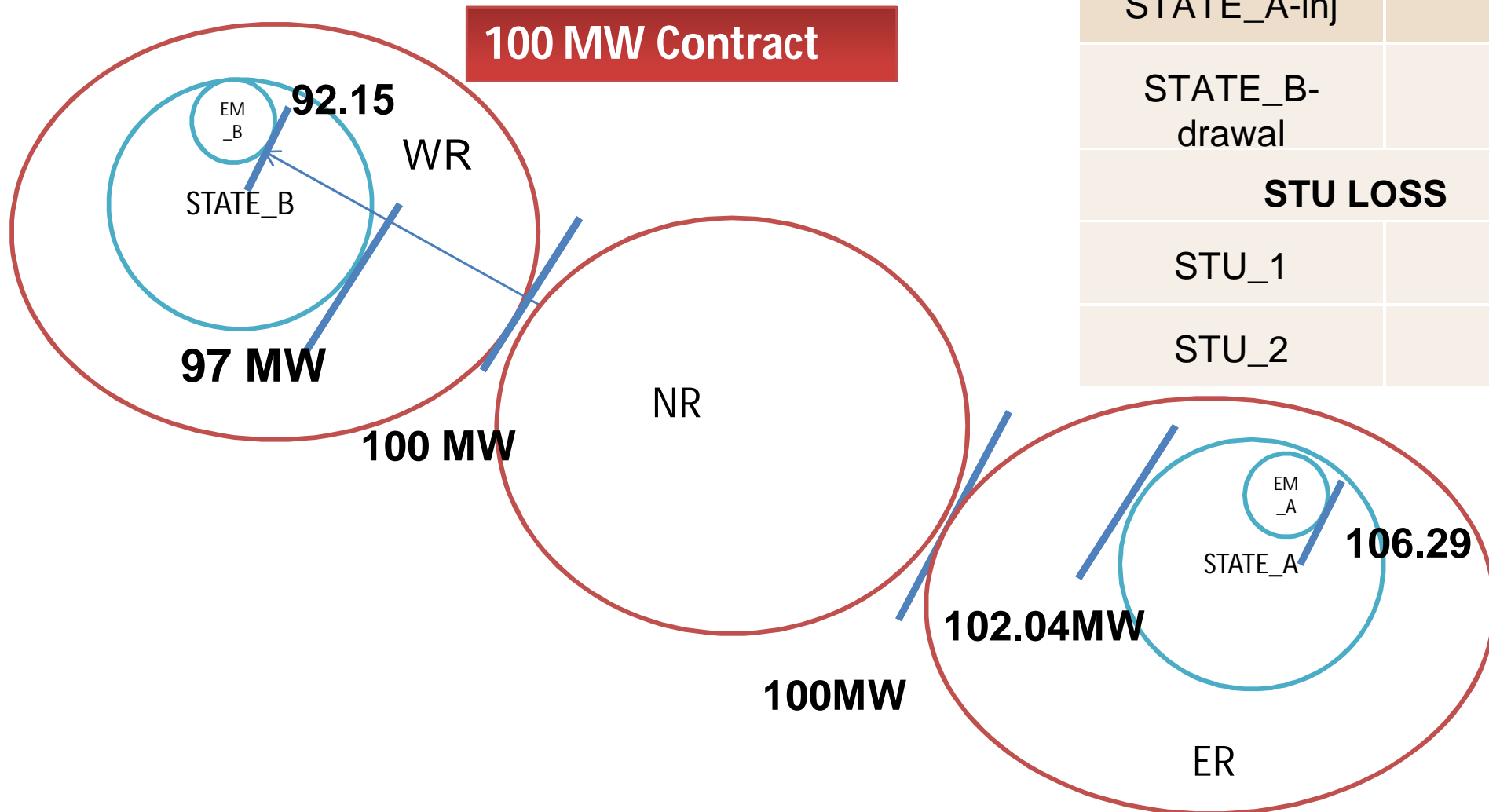
Region	POC Losses Slab								
	I	II	III	IV	V	VI	VII	VIII	IX
Northern	4.03	3.78	3.53	3.28	3.03	2.78	2.53	2.28	2.03
Western	2.62	2.37	2.12	1.87	1.62	1.37	1.12	0.87	0.62
Eastern	2.6	2.35	2.1	1.85	1.6	1.35	1.1	0.85	0.6
North-East	2.1	1.85	1.6	1.35	1.1	0.85	0.6	0.35	0.1
Southern	2.22	1.97	1.72	1.47	1.22	0.97	0.72	0.47	0.22

Case III : Long/Medium Term Transactions Involving Wheeling Region



Zone	Moderated Loss (%)
GEN_A-inj	2
STATE_B-drawal	3

Case VIII : Intra-Regional Short Term /PX Transactions (embedded to embedded)



Zone	Moderated Loss (%)
STATE_A-inj	2
STATE_B-drawal	3
STU LOSS	
STU_1	4
STU_2	5

References:

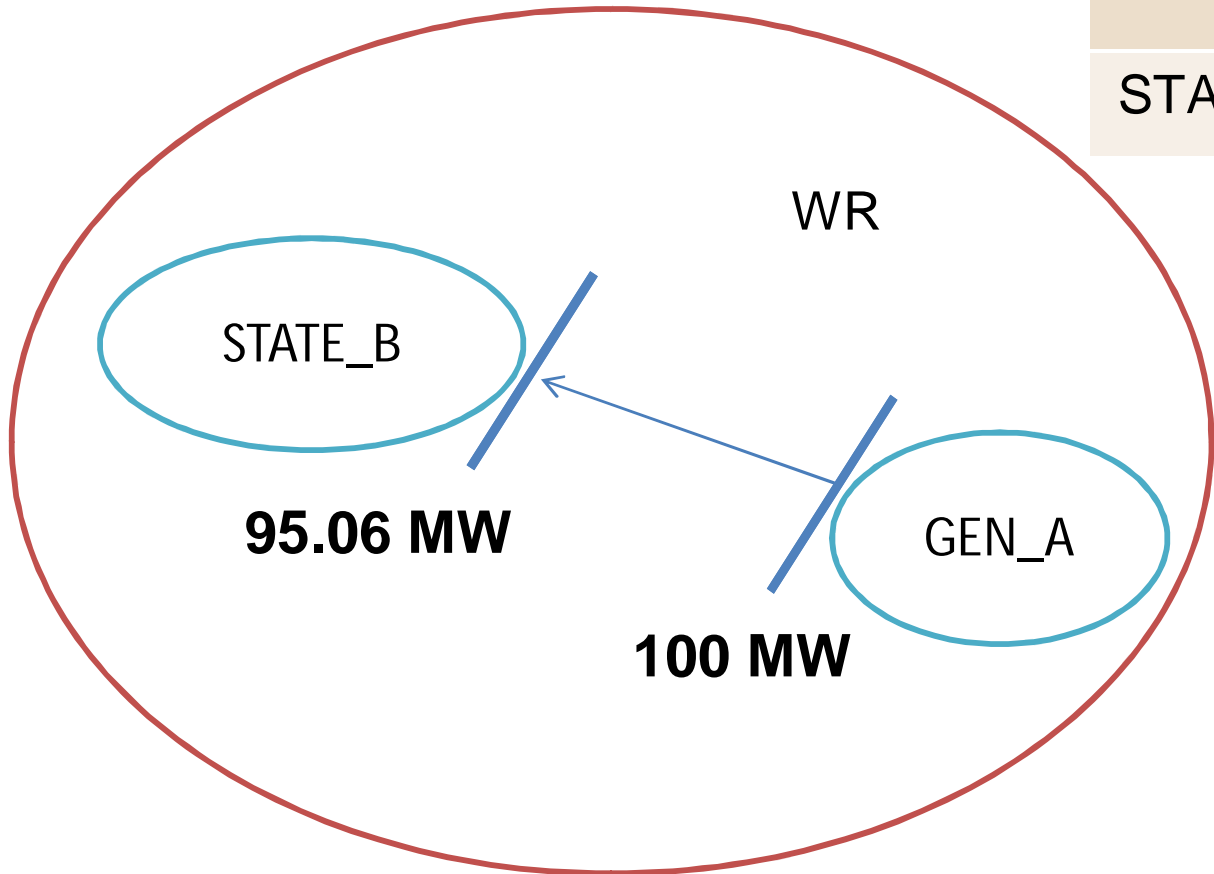
1. CERC(Indian Electricity Grid Code) Regulations 2010 and Amendments thereof .
2. CEA(Technical standard for Connectivity to the Grid) Regulation, 2007 and any Amendments thereof..
3. CEA(Installation of Operation of Meters) Regulation 2006 and any Amendment thereof.
4. CEA (Measures Relating to Safety and Electric Supply) Regulations, 2010 any Amendment thereof.
5. CERC(Grant of Connectivity, Long Term Access and Medium Term Open Access in Inter State Transmission and related matters) Regulation 2009 and any Amendment thereof.
6. CERC Approved Procedure for making application for Grant of Connectivity 2009 & amendments
7. CERC (Deviation Settlement Mechanism and Related matters) Regulation 2014 and Amendments thereof.
8. CERC Approved Procedure for drawal of start-up power under Deviation Settlement Mechanism 2014
9. CERC (Measures to relieve congestion in real time operation) Regulation, 2009 and Amendments
10. CERC (Open access in inter-state transmission)Regulation 2008 and further Amendments thereof.
11. CERC (Fees and Charges of Regional Load Despatch Centre) Regulation 2015 and Amendments thereof.
12. CERC (Sharing of Inter State Transmission Charges and Losses) Regulation 2010 and Amendments
13. CERC (Terms & Conditions of Tariff) Regulation 2014 and Amendments
14. CERC (Power Market Regulations) 2010 & amendments
15. NLDC Procedure for New Transmission Element Integration & Certification
16. CERC Order dated 05.01.2016 in Petition No 420/MP/2014 on LVRT implementation
17. CERC(Communication System for Inter-state Transmission of Electricity)Regulations 2017
18. CERC Approved Procedure dated 03.03.2017 for 'Implementation of the Framework on Forecasting, Scheduling, Imbalance handling of Renewable Energy Generating Stations including power parks based on Wind and Solar at Interstate level'.



Thank You !

Case I : Intra-Regional Long /Medium Term Transactions

100 MW Contract

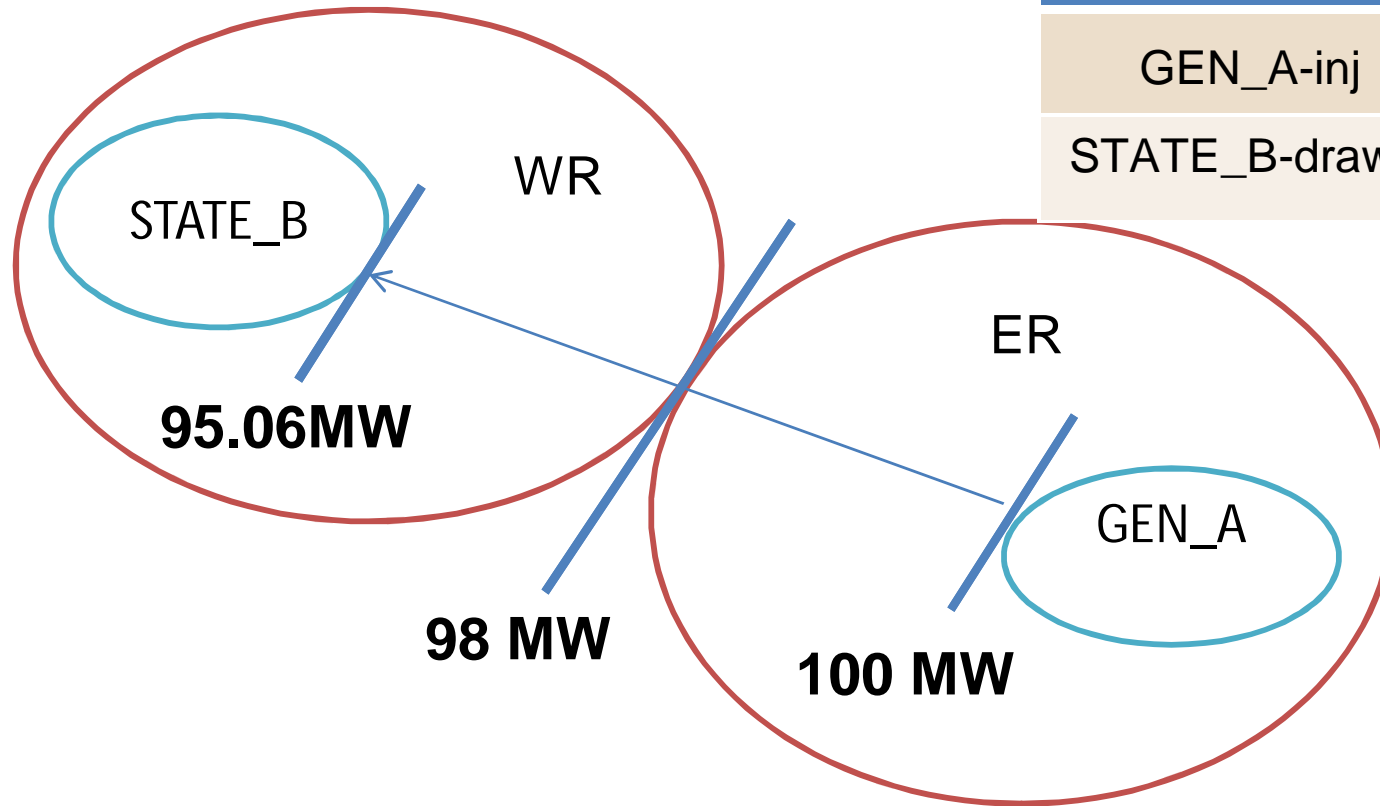


Zone	Moderated Loss (%)
GEN_A-inj	2
STATE_B-drawal	3

As per POC regulation drawee beneficiaries will continue to bear the injection loss & withdrawal loss for long term and medium term transactions.

Case II : Inter Regional Long/Medium Term Transactions

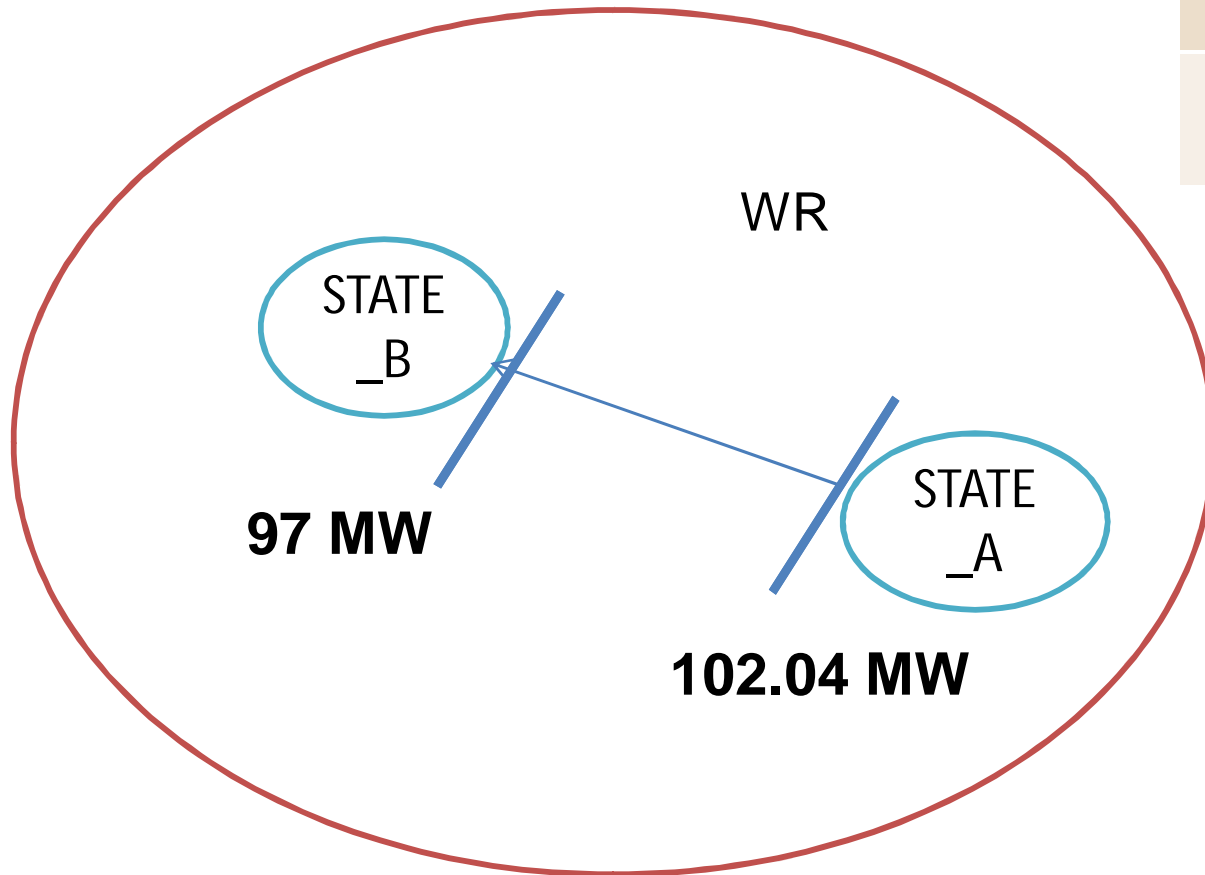
100 MW Contract



Zone	Moderate d Loss (%)
GEN_A-inj	2
STATE_B-drawal	3

Case IV : Intra-Regional Short Term /PX Transactions

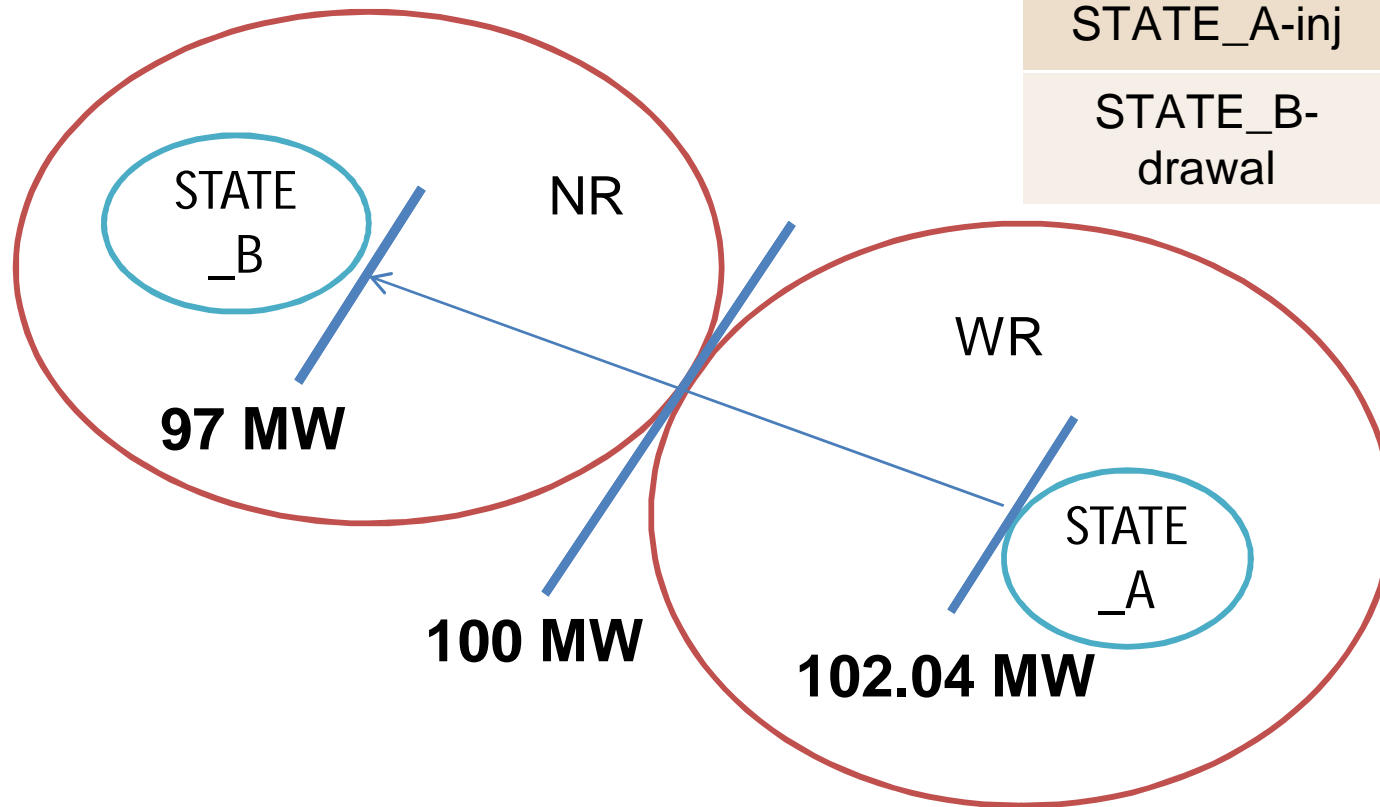
100 MW Contract



Zone	Moderated Loss (%)
STATE_A-inj	2
STATE_B-drawal	3

Case V : Inter Regional Short Term /PXTransactions

100 MW Contract

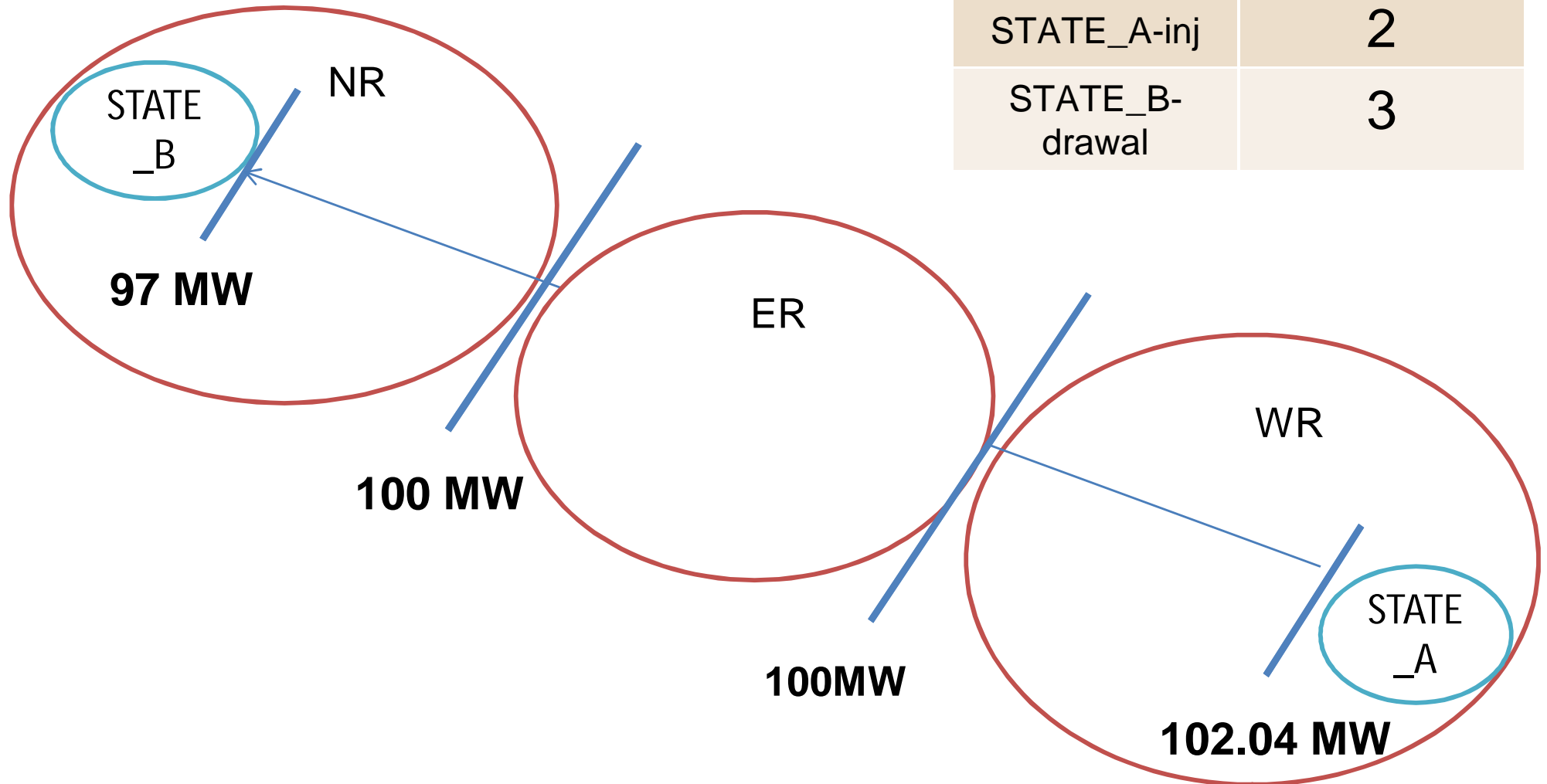


Zone	Moderated Loss (%)
STATE_A-inj	2
STATE_B-drawal	3

Case VI : Inter Regional Short Term /PX Transactions

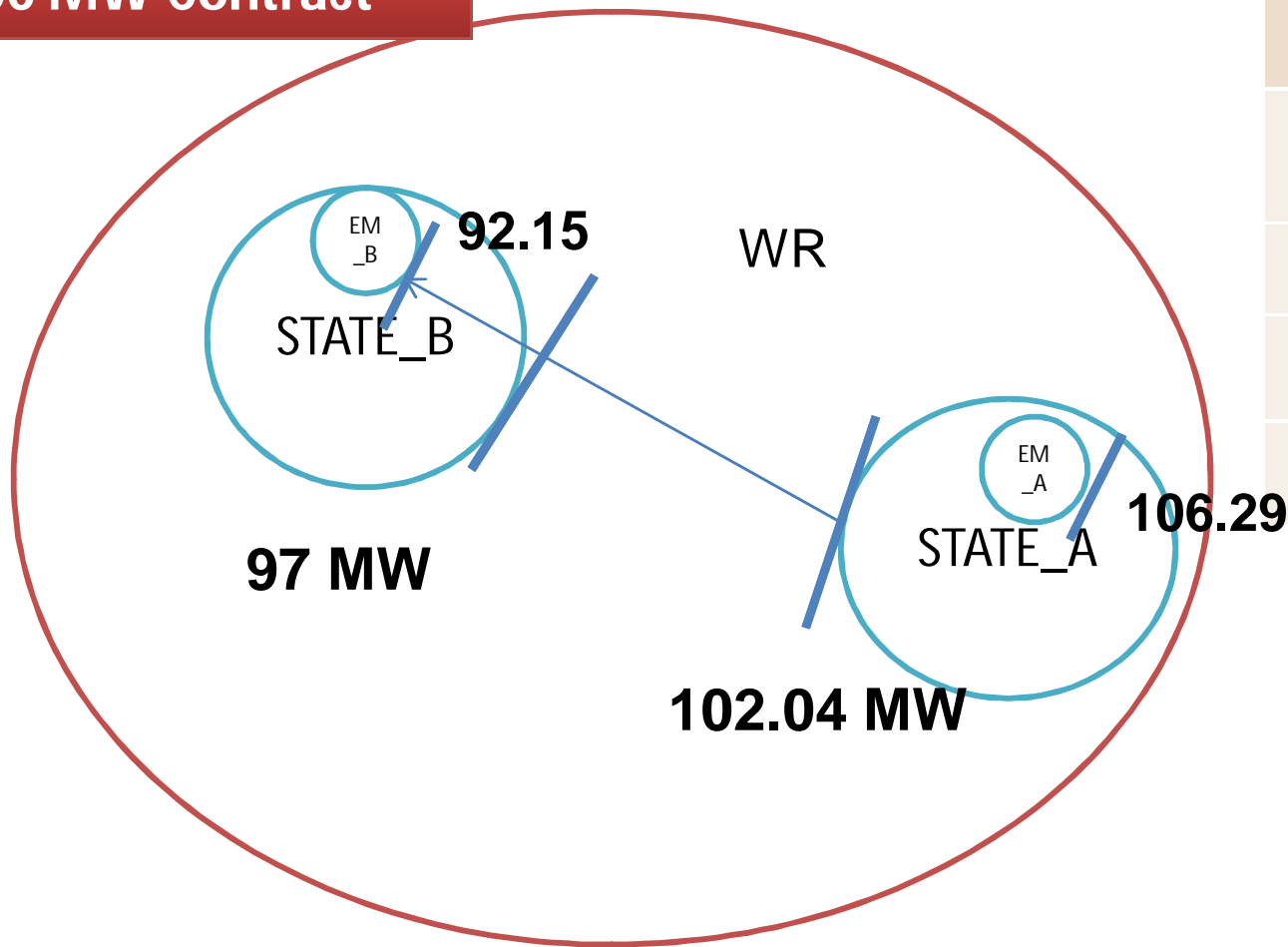
100 MW Contract

Zone	Moderated Loss (%)
STATE_A-inj	2
STATE_B-drawal	3



Case VII : Intra-Regional Short Term /PX Transactions (embedded to embedded)

100 MW Contract



Zone	Moderated Loss (%)
STATE_A-inj	2
STATE_B-drawal	3
STU LOSS	
Stu_1	4
Stu_2	5